

Experiment # 4

Common Base and Common Collector Amplifier Characteristics.

The aim of this experiment is to explore the characteristic of Common Base (CB) and Common Collector (CC) Amplifier.

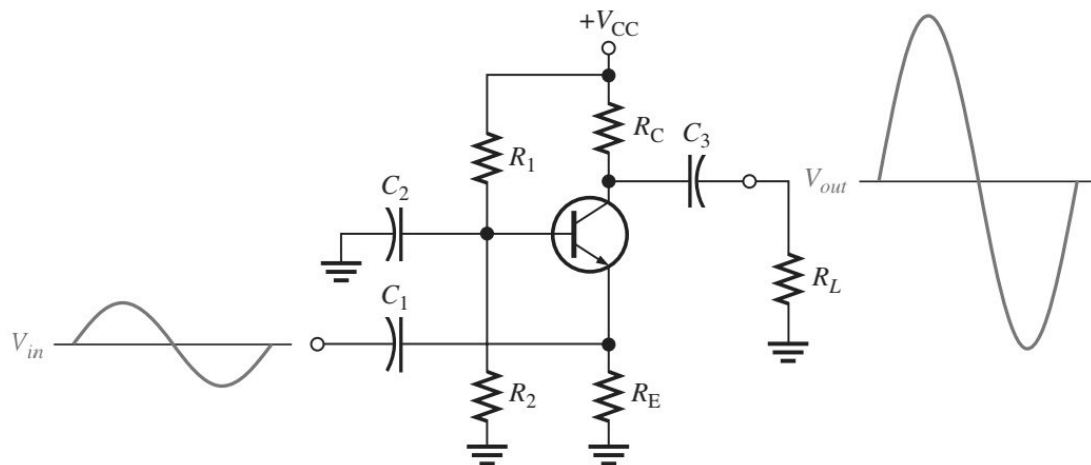
Introduction:

Bipolar Junction Transistor (BJT) plays an important role in both discrete and integrated circuit design. Amplification of signal is important for further processing of the signal. CB and CC amplifier have different properties, so depending on the requirement suitable amplifier can be chosen. Here in this experiment NPN Common Base and Common Collector Amplifier will be characterized.

1. CB Amplifier:

Here input signal is applied at the emitter and output is taken from collector. The base of BJT is common between input and output, hence the name CB.

The properties of such amplifier circuit are: (i) high voltage gain (ii) current gain < 1 (iii) high bandwidth (iv) low input impedance and (v) high output impedance.



- Find out the DC operating point and check whether the circuit is in active region or not.
- Apply sine wave (peak to peak 20mV, 10 kHz) through a capacitor 10 μ F at emitter. **Plot input and out signal with respect to time. Output is measured at collector of BJT (with and without a capacitor 10 μ F connected at collector of BJT). You may take an R_L at the output to see its effect on gain.**

c) **Plot Gain (dB) vs Frequency (500 Hz - 5 MHz) of the above circuit.**

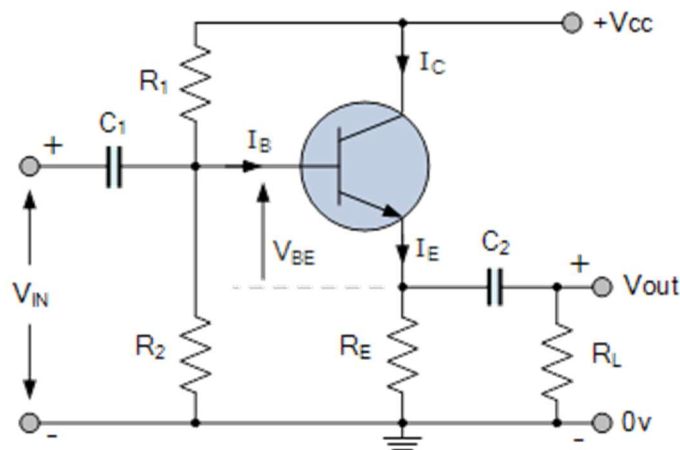
d) Find the Bandwidth of the amplifier.

2. CC Amplifier:

Here input signal is applied at the base and output is taken from emitter. The collector of BJT is common between input and output, hence the name CC.

The properties of such amplifier circuit are: (i) voltage gain ~ 1 (ii) current gain β (iii) high bandwidth (iv) high input impedance and (v) low output impedance.

So, CC amplifier is used as a buffer, e.g. CC amplifier can be placed between a CE amplifier and a small load to act as a buffer.



a) Find out the DC operating point and check whether the circuit is in active region or not.

b) Apply sine wave (peak to peak 4 V, 10 kHz) through a capacitor 10 μF at base. **Plot input and out signal with respect to time. Output is measured at emitter of BJT. You may take $R_L = 1 \text{ K}\Omega$.**

c) **Plot voltage Gain (dB) vs Frequency (50 Hz - 50 MHz) of the above circuit. Increase the frequency to check the bandwidth.**

d) Plot input current and output current and check the current gain of the circuit.